

## FIBER DIET ON LIFE STYLE HEALTH PROFILES IN HYPERTENSIVE MALES OF VARIOUS ETHNIC POPULATIONS

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### Abstract

Hypertension is a foremost public wellbeing setback. Though many nutritional factors shake the threat of developing hypertension. Certain studies suggest that ingesting of breakfast cereal and occurrence of hypertension. We observed the role of breakfast cereal and whole wheat chapatti consumption on the hypertension hazard. We prospectively analyzed data from 64 male participants (32 control : 32 hypertensive). We perceive body mass index (BMI), systolic and diastolic blood pressure, total cholesterol, low density lipoprotein cholesterol, high density lipoprotein cholesterol and triglycerides in sera were studied in both control as well as hypertensive male for 4 weeks on major ethnic groups *i.e.*, Pathan, Baloch, Hazara, and Punjabi in Quetta region. Bran diet supplementation decreased systolic blood pressure (SBP) markedly in B ( $P < 0.001$ ), P ( $P < 0.001$ ) and H ( $P < 0.05$ ), and exhibited significant reduction in diastolic blood pressure (DBP) in Pathan only. Total cholesterol was significantly decreased in B ( $P < 0.05$ ), H ( $P < 0.01$ ) and PU ( $P < 0.01$ ) with bran diet supplementation. The fraction of LDL-C was noticeably reduced in B, ( $P < 0.05$ ), P ( $P < 0.05$ ). HDL-C considerably increased in Pathan ( $P < 0.01$ ). The triglyceride lowered in B ( $P < 0.05$ ) and P ( $P < 0.001$ ) male subjects. In general there are corresponding comeback ks of abating lipid profile among the various indigenous groups; however, the deviations observed are likely of nutrigenomic impact.

### Introduction

Hypertension (HTN) is a main public health risk, and it is noted that it cost almost in billions (Lloyd-Jones *et al.*, 2010). It is a significant variable that raise the risk of coronary heart disease and stroke (Vasan *et al.*, 2001).

Kochar *et al.*, (2012) observed in middle aged adult males that using up of whole grain breakfast confers a lower risk of hypertension. A major cardiovascular disease risk factor for hypertension is above optimal ( $<120 < 80$  mm Hg) level of BP (Chirac *et al.*, 2002; Stamler *et al.*, 2003).

The studies of Jenkins *et al.* (1975) and Anderson *et al.* (1998) reported that high fiber diet can controlled lipid profile, may protect against ischemic heart disease (IHD) and blood pressure.

The blood cholesterol is closely related with hypertension. The lipid profile of hypertensive patients are usually higher and it can be control either by diet or by medicines (Burke *et al.* 1991). It is also well established that vegetarians have a lower blood pressure than do non-vegetarians (Fraser, 2003).

There are several factors, which affects plasma cholesterol concentrations (Harlan *et al.*, 1984). There is much evidence now that intake of dietary fibre reduces the risk of hypertension and cardiovascular complications; however, it is yet to understand the mechanisms in this relationship.

There is ample study that daily intake of dietary fibre cut down the risk of harmful diseases like hypertension and cardiovascular complication; however, the depth of machinery which lead all process is yet to figure out. To observe this approach regarding fiber intake on pertinent lipid targets and particularly to evaluate the distinguishing characteristic of such responses in a range of ethnic sub-population inhabiting matching environments. Evidence of ethnic specificity to nutrition on metabolic targets is being gradually understood in term of nutrigenomics, and studies on the relationship are being reported. Klimentidis *et al.* (2012) have asserted on the differences in risk factors for elevated blood pressure among ethnic groups. The significant variation in dietary approaches to stop hypertension (DASH) goal attainment among different ethnic groups has also been reported (Gao *et al.*, 2009).

The literature reports of various health benefits of bran diet including weight gain and lipid profiles. The present study is carried out to investigate the bran diet effects on similar targets in various ethnic populations inhabiting higher altitude land at Quetta, Balochistan, Pakistan

## Material Method

The study has been focused to investigate the role of bran supplementations on body mass index, lipid profile and some hemodynamic targets in male genders of the local population with diverse hypertensive individuals ethnicity groups which included Baloch (B), Pathan (P), Hazara (H) and Punjabi (PU) in different ethnic populations residing Quetta region of Balochistan.. The trials were carried out on hypertensive populations with the controls. In each trial, 32 males subjects i.e. 8 for every ethnic group participated in the study. The control subjects used the conventionally available refined carbohydrate and treated group consumed whole wheat chapattis in lunch and dinner and 50g wheat cereals in breakfast for four weeks. A day after completion of experiment duration 12 hours fasting blood fasting was taken from control and treated subjects.

To find out the significant results statistical program of Sigma Stat 3.5 was performed. For comparison of groups paired Students t' test was used to analyzed the results significance, however, ( $P < 0.05$ ) was considered as significant.

## Results

### Age

The age of control hypertensive males ranged at  $45.4 \pm 6$ ,  $47 \pm 6.1$ ,  $48.8 \pm 5.6$  and  $46.1 \pm 4.3$  years and in bran consumers groups it was  $41.3 \pm 5.48$ ,  $51 \pm 6$ ,  $52 \pm 5.7$  and  $39.0 \pm 3.6$  years in Baloch, Pathan, Hazara and Punjabi sub-populations respectively. The volunteers were almost in the middle age thus compatible for the assessment (Table 1).

### Body Mass Index (BMI)

Body mass index of control male hypertensive Baloch subjects averaged at  $29.5 \pm 1$  and  $28.6 \pm 0.19$  kg/m<sup>2</sup>. The analogous values were  $31 \pm 1.6$  and  $30 \pm 2$  kg/m<sup>2</sup> in the control and bran taking Pathan volunteers. In Hazara control subjects it was  $30.0 \pm 2.0$  and  $28.9 \pm 1.8$  kg/m<sup>2</sup> in bran consuming subjects. In Bran supplemented values of BMI were  $34.8 \pm 1.6$  and  $31.3 \pm 1.9$  kg/m<sup>2</sup> in the controls and bran consuming Punjabi volunteers respectively (Table 1).

All ethnic groups using bran diet for 4 weeks showed significant reduction in BMI when compare to controls.

### Blood Pressure

In Baloch control male SBP at  $186 \pm 4$  mmHg and DBP was noticed at  $87.25 \pm 2.0$  mm Hg was noticed. In bran supplemented male of this ethnic group, SBP recoded was  $157.87 \pm 5.7$  mm Hg and DBP was  $84.6 \pm 2.5$  mm Hg. Statistically significant response ( $P < 0.001$ ) was noticed in SBP with 15.3 % reduction, however no change was noticed in DBP. Pathan control volunteers exhibited SBP as  $183 \pm 2.8$  mm Hg and DBP at  $89 \pm 1.6$  mm Hg. While in bran consumers SBP was  $153.25 \pm 5$  mm Hg and DBP was  $82.75 \pm 2.0$  mm Hg. Marked significant reduction ( $P < 0.001$ ,  $P < 0.024$ ) was noticed in SBP and DBP respectively. In Hazara control volunteers SBP was  $180.6 \pm 4.8$  mm Hg and DBP was  $88.0 \pm 2.5$  mm Hg. In bran supplemented volunteers SBP was observed as  $161.87 \pm 6.9$  mm Hg and DBP at  $84.4 \pm 1.1$  mm Hg. Recorded SBP was markedly and significantly decreased ( $P < 0.044$ ). Punjabi control volunteers exhibited SBP at  $177.5 \pm 4.7$  mm Hg and DBP at  $93.4 \pm 2.6$  mm Hg. Bran supplementation showed comparatively reduced SBP at  $158 \pm 8.2$  mm Hg and DBP and  $86.3 \pm 2.5$  mm Hg, however, no significant change was observed.

Significant lowering was observed in SBP in all males except Punjabi and DBP in Pathan volunteers only (Fig. 1 & 2).

Males showed a good response on SBP in all ethnic groups except Punjabi subjects. However DBP fall was observed only in Pathan volunteers.

### Total Cholesterol

In Baloch volunteers of this group the concentration of cholesterol was  $248.12 \pm 8$  mg/dl in the controls and estimated at  $222.9 \pm 7.66$  mg/dl in the subjects who consumed bran diet. An appreciable reduction of 10.2% values in the bran supplemented group was found and was statistically significant ( $P < 0.036$ ). The total cholesterol concentration of  $247 \pm 6.4$  mg/dl was observed in hypertensive control males and  $240 \pm 14$  mg/dl was estimated in the bran taking Pathan volunteers. The fraction was found to be slightly lower (2.9%) in bran consuming males but not statistically significant. In Hazara control subjects the concentration of cholesterol was  $255.3 \pm 6.3$  mg/dl comparable to bran diet taking volunteers of this ethnicity the level was estimated to be  $229.75 \pm 5.7$  mg/dl. Bran diet supplementation exhibited 10.1% significant reduction ( $P < 0.009$ ) in the fraction levels. An average level of  $264.1 \pm 5.1$  mg/dl in the hypertensive controls and  $242.4 \pm 5.2$  mg/dl in bran supplemented hypertensive Punjabi volunteers was observed. The fraction was found to be 9.3% lower in the

bran consumers subjects than the controls, however, was found to be highly significant ( $P < 0.01$ ) statistically (Fig. 3).

Although the cholesterol concentration is well beyond the upper borderline of the normal values, the bran supplementation exhibited a lowering effect and values were reduced significantly in Baloch, Hazara and Punjabi volunteers.

#### Low Density Lipoprotein Cholesterol (LDL-C)

In Baloch control hypertensive male subjects the concentration of LDL cholesterol was  $164.75 \pm 4$  mg/dl. In comparison in the bran consuming male of this ethnic group the level was  $153.3 \pm 2.98$  mg/dl. The estimated fraction was markedly lower (7%) and statistically significant ( $P < 0.049$ ). Hypertensive Pathan control group exhibited the concentration of  $168 \pm 5.3$  mg/dl, while it was  $152.2 \pm 4$  mg/dl in bran taking volunteers. The difference was found to be statistically significant ( $P < 0.028$ ) with 7.2% reduction. A concentration of  $159.9 \pm 5.1$  mg/dl and  $145.7 \pm 2.2$  mg/dl LDL cholesterol was estimated in the controls and bran taking Hazara volunteers. Hypertensive Hazara volunteers on bran diet manifested statistically significant reduction of 9.9% ( $P < 0.023$ ). In Punjabi volunteers of this group the concentration of LDL cholesterol was  $160.8 \pm 4.1$  mg/dl in the controls while it was  $152.3 \pm 1.8$  mg/dl in bran taking people with only slight (5.3%) reduction (Fig. 4).

In hypertensive male, all ethnic groups except Punjabis, explicit considerable decrease in LDL cholesterol level on bran diet supplementation. The concentration values of the fraction were at borderline compared to normal LDL level in men.

#### High Density Lipoprotein Cholesterol (HDL-C)

In Baloch control participants the concentration of the HDL cholesterol was  $35.62 \pm 1$  mg/dl. In comparison in bran taking people of this ethnic group the level was estimated to be  $38.9 \pm 1.57$  mg/dl. The estimated values were insignificantly different from controls. A concentration of  $37 \pm 1.3$  mg/dl HDL cholesterol was estimated in control and  $43.1 \pm 1$  mg/dl was observed in bran taking Pathan subjects. Elevated levels were found in bran consuming group and exhibited statistically significant difference ( $P < 0.001$ ). In Hazara volunteers of this group the concentration of HDL cholesterol was  $38.9 \pm 1.2$  mg/dl in the controls and was  $44.1 \pm 2.2$  mg/dl in bran consuming Hazara subjects. A slight increase of 13% was noticed in bran supplemented group. The average comparable values of HDL cholesterol concentration were  $36.3 \pm 1.0$  mg/dl in controls and  $41.0 \pm 1.2$  mg/dl in bran taking Punjabi subjects. The fraction was insignificantly higher in bran supplemented volunteers (Fig. 5).

In this trial the HDL cholesterol concentration were lower in controls compared to normal values. However, in bran taking subjects significant improvement was noticed only in Pathan subjects of this ethnic sub-population. In others the increase was statistically insignificant.

#### Triglycerides

In Baloch control volunteers the concentration of triglycerides was  $193.25 \pm 6$  mg/dl. In comparison to bran diet consumers of this ethnicity the level was observed to be  $178 \pm 3.62$  mg/dl. The difference in the compared value was found to be marked and significantly lower ( $P < 0.046$ ). The concentration of triglyceride was  $194 \pm 2.4$  mg/dl and  $157.6 \pm 5$  mg/dl in controls and bran taking Pathan volunteers respectively. The triglyceride fraction was markedly lower in bran taking batch, and was found statistically significant ( $P < 0.001$ ). In Hazara volunteers of this group the concentration of triglycerides was  $183.6 \pm 8.5$  mg/dl in the controls and was  $178.1 \pm 14.5$  mg/dl in bran supplemented subjects. The supplemented diet subjects showed 3% non-significant decline. The mean values of triglycerides concentration were  $182.3 \pm 6.0$  mg/dl and  $167.5 \pm 10.2$  mg/dl in the controls and in bran consuming Punjabi volunteers. (Fig. 6).

In all ethnic groups of this batch the control values were at borderline compared to healthy subjects, following bran consumption significant lowering was noticed only in Baloch and Pathan volunteers.

#### Discussion

These results demonstrated noticeable influence of bran diet on hypertension in the all subjects. In males SBP markedly decreased in B ( $P < 0.001$ ), P ( $P < 0.001$ ) and H ( $P < 0.05$ ). Bran diet exhibited significant ( $P < 0.05$ ) reduction in DBP in Pathan groups.

According to previous studies wholegrain food can be reduced blood pressure in some (Saltzman *et al.*, 2001; Keenan *et al.*, 2002) but not all (Kestin *et al.*, 1990; Swain *et al.*, 1990; Davy, 2002) trials. The DASH diet, comprises of healthy food and whole grain (Sacks *et al.*, 1989) show lowered blood pressure in 459 adults with baseline SBP  $\geq 160$ mmHg and DBP 80–95 mm Hg (Appel *et al.*, 1997). The current research follows with these previous finding and give several beneficial evidences about the intake of whole grains in hypertension prevention. Though whole grains with multiple nutritional components have numerous beneficial effects for the development of hypertension with incomplete understandable biological pathway (Slavin, 2005). Several cohort

studies explain that whole grains contain the dietary fiber, foliate, potassium, and magnesium that related inversely with blood pressure (Ascherio *et al.*, 1992; Forman *et al.*, 2005), however nutrients supplements for lowering the blood pressure in clinical trials shows less or unpredictable effects (Whelton *et al.*, 1989). In whole grains the fibrous parts may play protective role in progression of hypertension.

Wang *et al.* (2007) demonstrate the USDA recommendations that is intake of 1-2 whole grain and 2-4 servings/d or from the whole grains the total 43-58% grains help in less hazards of hypertension. The USDA recommendations strongly supported by this data as hypertension hazards can be lower by great intake of whole grain. Since in United States about 50 million people suffer with greatly widespread hypertension disease (Chobanian *et al.*, 2003), although in individual level modest decrease in hazards of hypertension will significantly suppress the burden of wide-population disease. Refine grain food in quickly change in food industry in whole grain food however the great use of whole grain is essential in US diet for follow-up the USDA recommendations (USDA, 2005).

(The study of hypertension individuals reveals that improvement in blood pressure can be found by the use of whole-grain along wheat cereal and with less medication of anti-hypertension (Pins *et al.*, 2002).

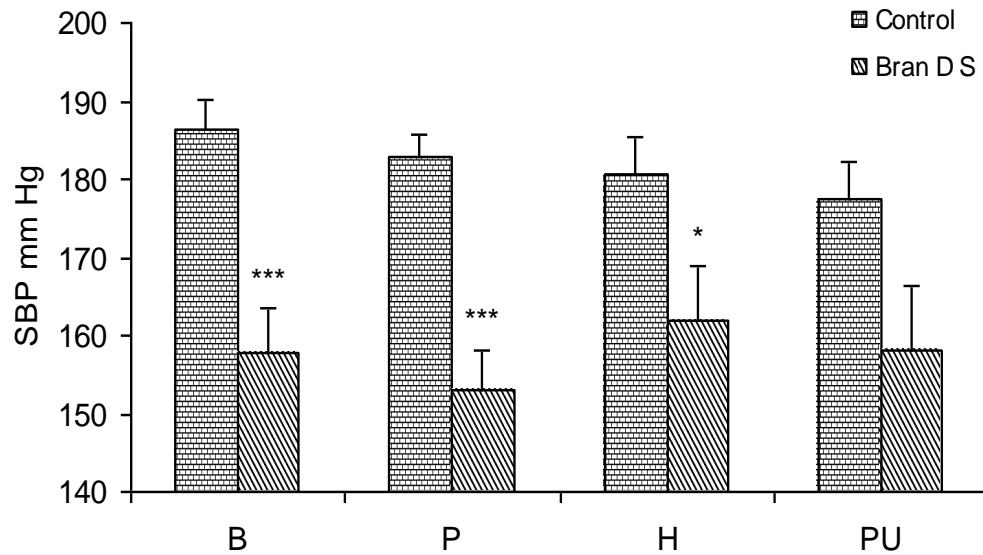
Weight gain over time may be a mechanism by which whole-grain intake is related to hypertension. This also explains the selective effect of the fiber diet on the body weight of different ethnic sub-populations and even the different genders in the same ethnic group.

Findings of the present study explicit marked effects on lipid profile in all ethnic groups. Total cholesterol was significantly decreased in [B ( $P < 0.05$ ), H ( $P < 0.01$ ) and PU ( $P < 0.01$ )], LDL-C was noticeably reduced in [B, ( $P < 0.05$ ), P ( $P < 0.05$ ) and H ( $P < 0.05$ )], where as HDL-C was considerably decreased in only Pathan ( $P < 0.01$ ), The beneficial effects of bran diet on TG have been observed only in B ( $P < 0.05$ ) and P ( $P < 0.001$ ) subjects.

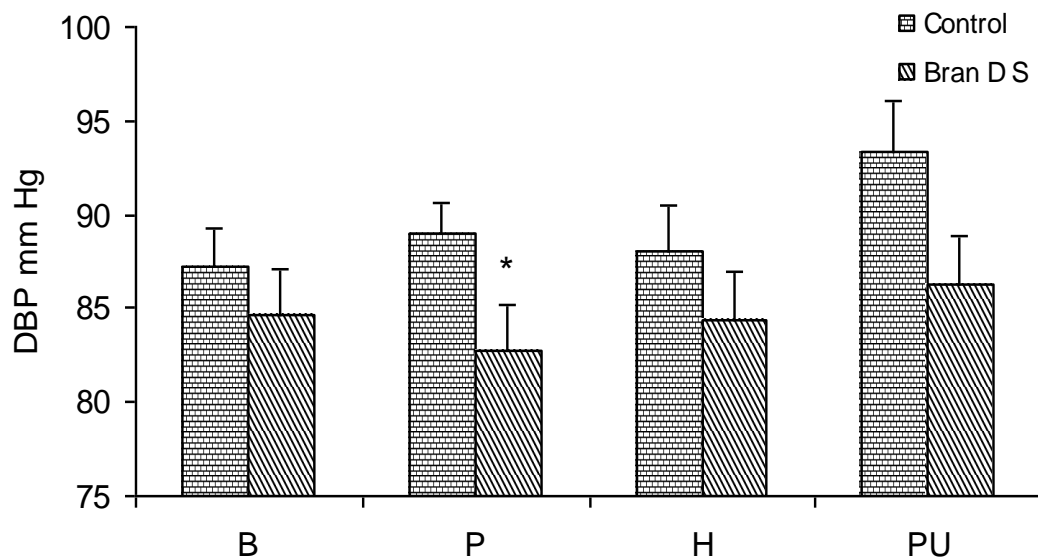
However in the current study the beneficial effects of bran diet supplementation have been observed. However, its effect has been implemented variedly in different ethnic sub-populations and also in different genders. It is quite likely that genetic makeup may be important factor in the outcome of the effect of fiber on lipid profile in different ethnic groups, the robustness of our conclusion in sensitivity analyses, and the fact that participants were consistent are strengths of the present study. This requires more dedicated studies from nutrigenomic aspects.

**Table 1. Represent average ages and BMI kg/m<sup>2</sup> in hypertensive male population of all ethnic groups in control (Con) and with Bran diet supplements (Bran D S).**

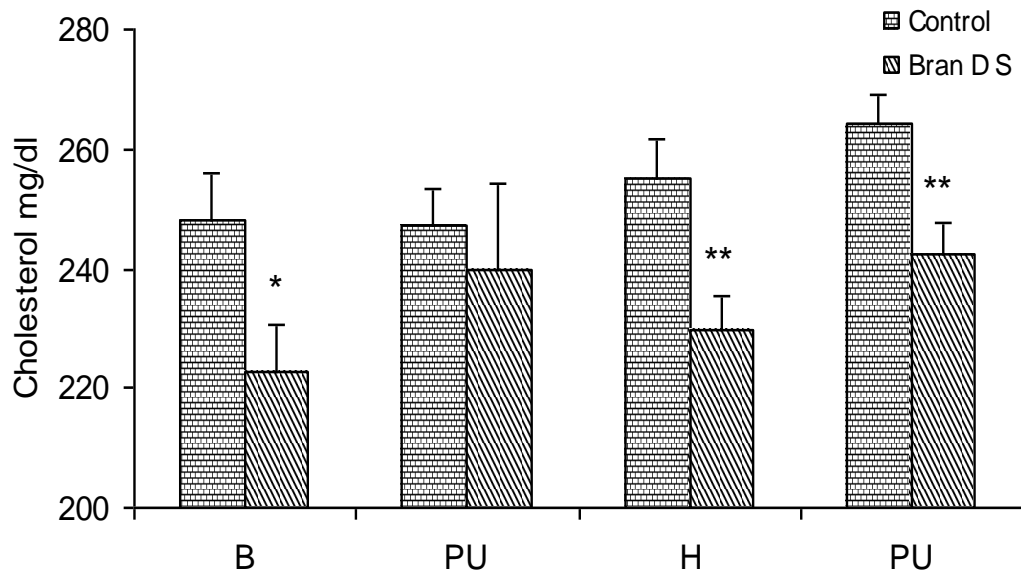
<b>Ethnic groups</b>	<b>Age (Con)</b>	<b>Age (Bran D S)</b>	<b>BMI kg/m<sup>2</sup> (Con)</b>	<b>BMI kg/m<sup>2</sup> (Bran D S)</b>
<b>Baloch</b>	45.4 ± 6	41.3 ± 5.48	29.5 ± 1	28.6 ± 0.91
<b>Pathan</b>	47 ± 6.1	51 ± 6	31 ± 1.6	30 ± 2
<b>Hazara</b>	48.8 ± 5.6	52 ± 5.7	30.0 ± 2.0	28.9 ± 1.8
<b>Punjabi</b>	46.1 ± 4.3	39.0 ± 3.6	34.8 ± 1.6	31.3 ± 1.9



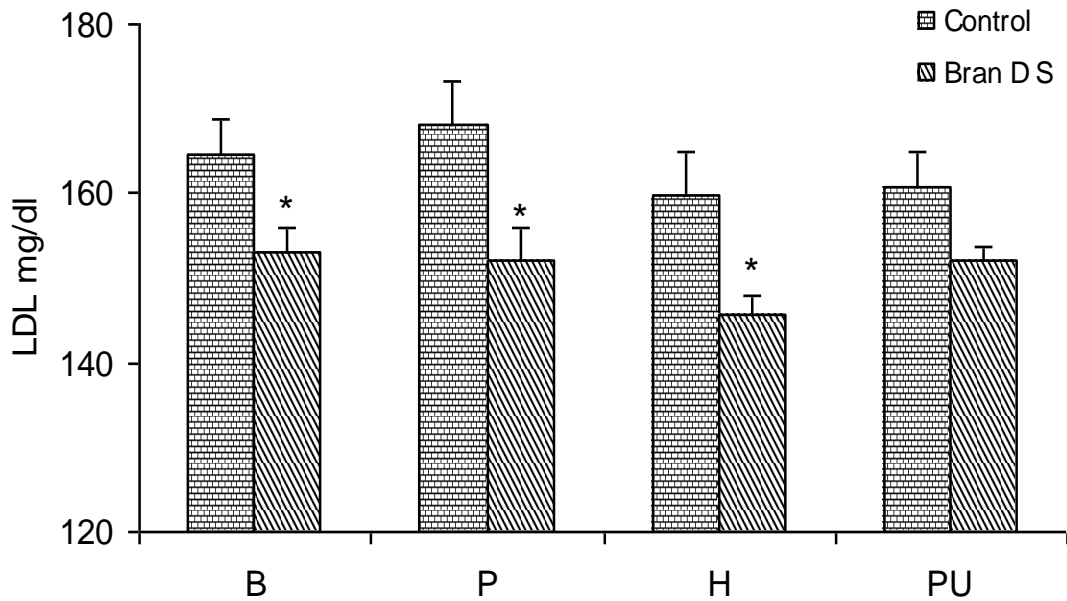
**Fig. 1 . An average systolic blood pressure (SBP mm Hg) in different ethnic groups B (Baloch), P (Pathan), H (Hazara) and PU (Punjabi) in male control and Bran Diet supplemented (Bran D S) subjects. \* (P < 0.05), \*\*\* (P < 0.001).**



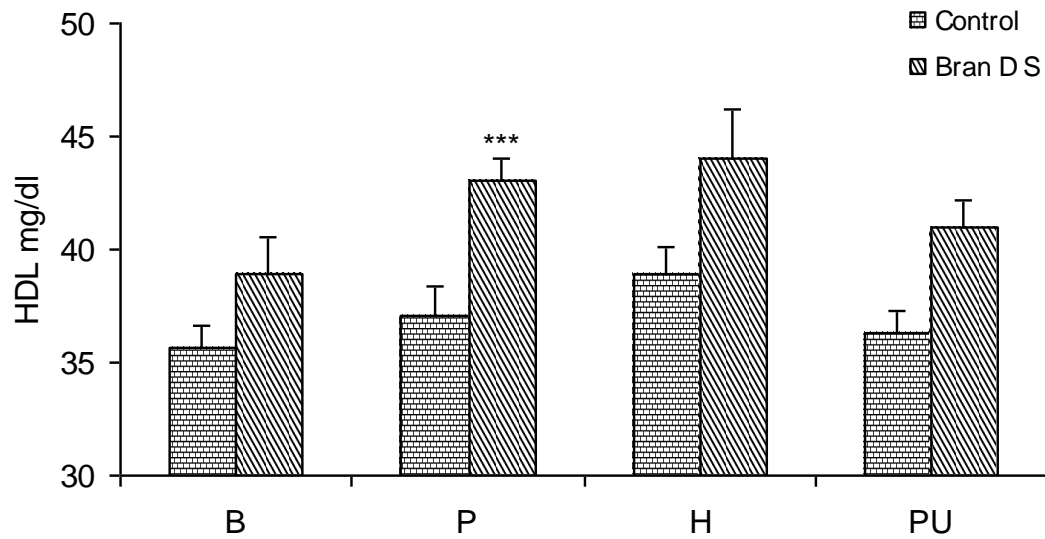
**Fig. 2 . An average diastolic blood pressure (DBP mm Hg) in different ethnic groups B (Baloch), P (Pathan), H (Hazara) and PU (Punjabi) in male control and Bran Diet supplemented (Bran D S) subjects. \* (P < 0.05).**



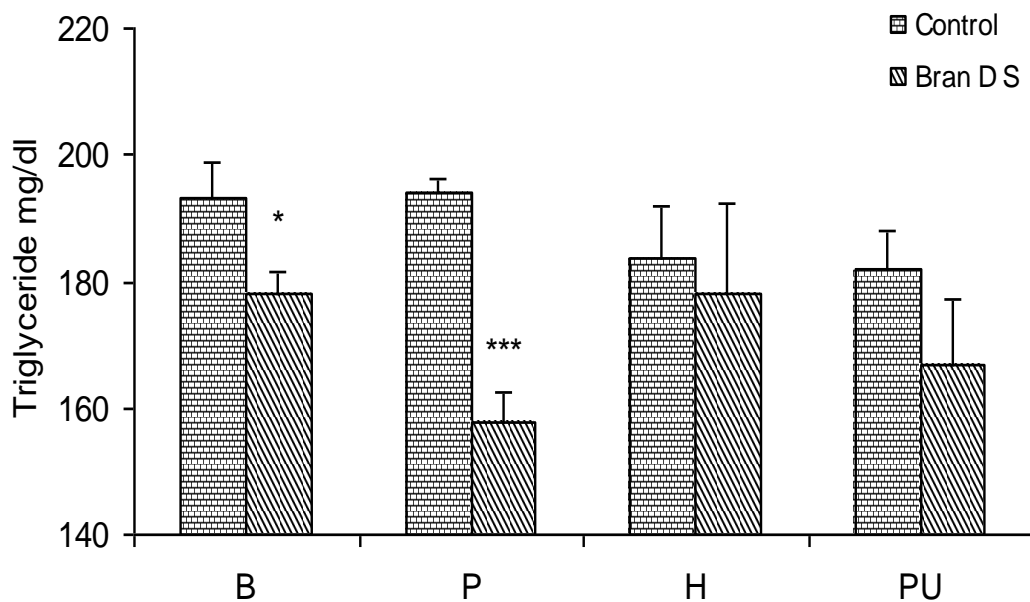
**Fig. 3.** Serum total cholesterol mg/dl in hypertensive males, of controls and bran diet supplementation (S) in P (Pathan), B (Baloch), H (Hazara) and PU (Punjabi) ethnic groups. \* P < 0.05, \*\* P < 0.01.



**Fig. 4.** Serum LDL cholesterol mg/dl in hypertensive males, of controls and bran diet supplementation (S) in P (Pathan), B (Baloch), H (Hazara) and PU (Punjabi) \* P < 0.05.



**Fig. 5. Serum HDL cholesterol mg/dl in hypertensive males, of controls and bran diet supplementation (S) in P (Pathan), B (Baloch), H (Hazara) and PU (Punjabi) ethnic groups. \*\*\* P < 0.001**



**Fig.6 . Serum triglyceride mg/dl in hypertensive males, of controls and bran diet supplementation (S) in P (Pathan), B (Baloch), H (Hazara) and PU (Punjabi) ethnic groups. \* P < 0.05, \*\*\* P < 0.001**

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